

SCIENCE.

FRIDAY, APRIL 3, 1885.

COMMENT AND CRITICISM.

THE TWO LATEST issues of volumes of observations, astronomical and meteorological, made at the U. S. naval observatory, to which we refer in another column, were received at our office presumably as soon as they were ready for general distribution; and we regret the necessity of calling attention to the delay with which the work of this institution is given to the scientific public. We are informed that this is due in no wise to neglect on the part of any officer of the observatory, but to the repeated exhaustion of the printing-funds annually allotted to the navy department to meet its current needs. However this may be, it is noticeable that the last four volumes — those issued since the delay at the government printing-office is said to have been the greatest hinderance — have only about half the number of pages of many former issues, owing largely to the abbreviated form of presenting the details of observation which the observatory wisely adopted in the volume for 1877.

There would seem to be no good reason why the printing of these volumes, requiring a specific sum each year, should not be provided for independently of the naval allotment of the printing appropriation, just as is now the case with many of the scientific publications of the government which are issued at stated intervals. It is to be hoped that the measure already on foot to secure this result may not end in defeat, as the gain will be great at no increase of expense whatever. The observatory is so far in arrears in this regard, that its foremost work should now be to bring the publication of its work up to date at any cost. The chief reason for making certain classes of observations lies in the expectation of their

immediate availability for scientific use; and the publication, in part, of mere results in astronomical journals, does not relieve the inconvenience and uncertainty attending one's inability to refer, when desirable, to the extended details of the work as presented in the complete volumes.

'FLATLAND,' to which we referred a short time ago, besides giving the general reader an easy view of the road by which the mathematician enters the world of n dimensions, contains also a clever picture of the ludicrousness of various social theories now under discussion, when pushed to their legitimate consequences. The inhabitants of that country have the shape of various plane figures, — triangles, squares, pentagons, and polygons, — and the degree of their intelligence is in direct ratio to the number of their sides; so that 'intellectuality' becomes synonymous with 'angularity,' and the circle is a member of the priestly order, — the highest class of all. Beyond the soldiers and the lowest class of workmen, who are triangles with only two sides equal, — a figure so irregular that it can hardly be considered human, — it is a law of nature that each male child shall have one more side than his father.

Evolution is thus a perfectly regular and definite process; and a man's remoteness from the flat apes, his ancestors, can be known by simply counting the number of his sides. Any slight irregularity in a figure is equivalent to a moral imperfection; and to train up a child in the path of virtue is to keep him straight in a literal sense. If he is born with any marked unevenness, he must be taken to one of the regular hospitals for the cure of that disease, or he is in danger of ending his days in the state prison. There is no way of knowing whether a particular delinquency calls for punishment or reward as a means of reform.

The author, a square, confesses that he is at a loss what course to pursue when one of his own hexagonal grandsons pleads as an excuse for his disobedience that a sudden change in the temperature has caused an unequal shrinking in his perimeter, and that the blame ought to be laid, not on him, but on his configuration, which can only be strengthened by abundance of the choicest sweet-meats.

The women in Flatland are straight lines. As they have no angles, they have no intellect; and as they have nothing to say, and no constraint of wit, sense, or reason to prevent their saying it, their conversation is a great bore. To such an extent has the system of female non-education or quietism been pushed, that they are no longer taught to read, nor to master arithmetic enough to count the angles of their husbands or children. The author fears that this policy has been carried so far as to react injuriously on the men, who are obliged to lead a bi-lingual or even a bi-mental existence. They must be able to speak not only the female language of emotion, but also the male language of science, in which 'love' becomes 'the anticipation of benefits,' 'duty' becomes 'necessity' or 'fitness,' and other words are correspondingly transmuted. In the presence of women, moreover, the language used implies the utmost deference for their sex; but behind their backs they are both regarded and spoken of as being little better than 'mindless organisms.' The strain of this dual existence, it is believed, has some tendency to enfeeble the male intellect, and on that ground alone the author appeals to the authorities to reconsider the regulations of female education.

LETTERS TO THE EDITOR.

The sun-thermometer during the recent eclipse.

At mid-day, just before the commencement of the eclipse, Draper's self-recording sun-thermometer of this observatory indicated a sun-temperature of 92° F., while the self-recording thermometer in the shade at the same time indicated 33° F.

When the obscuration was at its maximum, 1.30 p.m., the sun-temperature had fallen to 69°, while that in the shade was still 33°.

At the end of the eclipse, 2.50 p.m., the sun-temperature had risen to 82°, and that in the shade to 34°.

It is interesting to note from the above facts, that one-half of the difference between the sun-temperature and that in the shade, at the beginning of the eclipse, is 29½°; while the actual fall of temperature during the eclipse, as shown by the sun-instrument, was 23°. This is as it should be, for only about one-third of the sun was obscured. It is probable, that, if the eclipse had been total, the readings of the two instruments would have been the same.

DANIEL DRAPER, Ph.D., *Director*.
New-York meteorological observatory,
Central Park.

An attempt to photograph the corona.

It occurred to the writer that the late partial solar eclipse would be an excellent chance to repeat Huggins's experiments on photographing the corona. A three-inch refractor of about forty inches focal length was employed. A drop-shutter was attached to the lens, giving an exposure which was estimated at about a fifth of a second. A piece of deep-violet glass was procured, which could be inserted just in front of the plate, or removed, at pleasure. By its use a negative image of the sun's disk was obtained, but without it the plate gave a reversed image; the sun being a positive and transparent, while the surroundings remained negative and were dark, the appearance being strikingly similar to that of a photograph of a total solar eclipse. Both bromide and chloride plates were provided; but, as with Mr. Huggins, the latter proved to give much the better coronal effects. A ferrous-oxalate developer was employed, which contained a large proportion of potassium bromide. The weather throughout the eclipse was wholly favorable; and we began photographing at ten o'clock, two hours and twenty minutes before the eclipse began, and continued at work until five minutes past four, or an hour and ten minutes after it had terminated. Photographs were taken every half-hour, with extra ones interpolated at the more interesting phases, making twenty-nine pictures in all.

Very corona-like effects were certainly produced, faint rays here and there shooting out perpendicularly to the sun's surface. But unfortunately no two of the pictures were alike, and the corona in front of the moon was quite as well marked as that on the other side of the sun. Indeed, the most corona-like ray produced, appeared in one photograph stretching directly towards, and terminating at, the centre of the moon. Nine photographs taken in succession showed one side of the halo stretching to a greater distance than the other; but in one of these the darkening was carried so far out, that it became nearly separated from the rest of the corona, and appeared as a distinct dark circle of the same size as, and by the side of, the image of the sun. This, of course, showed it to be merely an internal reflection of that image, and nothing more. During the course of the experiments, the object-glass was revolved about its optical axis, photographs being taken in four positions. No effect, however, was discernible upon the plates.

The conclusions I should draw from my experiment are, 1°, that, though it is very easy to obtain a corona-like image, one may readily be deceived in such matters, and the same effect be obtained by our atmosphere, without the aid of the solar corona, combined with little defects in the gelatine film (this, I think, is conclusively shown by the extension of the pseudo-corona in front of the moon); 2°, that chloride

plates are more suitable than bromide for obtaining an atmospheric corona, just as Mr. Huggins has claimed that they are more suitable for taking a solar one; hence I think one must not rely too much on the ultra-violet region sensitiveness of the chloride plate for a separation of the two; lastly, though my experiments fail to corroborate Mr. Huggins's results, they do not, of course, show that his corona may not be solar, but merely indicate that under very favorable circumstances I could obtain no trace of it.

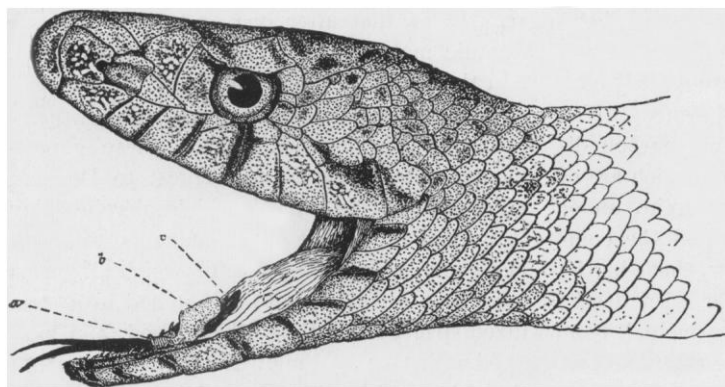
I have before me a print made from a negative by Dr. O. Lobse in October, 1878, showing effects very similar to those obtained by myself, except that his view was not taken during an eclipse. He considers that the halo is wholly atmospheric, and not coronal.

W. H. PICKERING.

Photographic laboratory, Mass. inst. technology.

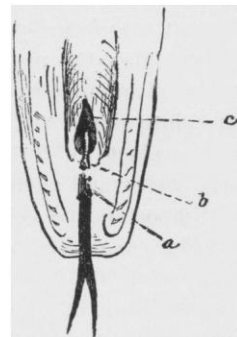
The voice of serpents.

The interesting observations presented by Prof. C. H. Hitchcock on this subject, in No. 104, and the additional experiments made by Mr. H. H. Nicholson upon a specimen of *Pituophis Sayi*, and recorded in No. 109, open a very interesting field for research.



LEFT LATERAL VIEW OF THE HEAD OF *PITUOPHIS SAYI* BELLONA, LIFE-SIZE.

(From *American naturalist*.)



THE MOUTH PARTS FROM ABOVE.

a, tongue-sheath; b, epiglottis; c, rima-glottidis.

If it has not already met your correspondents' eyes, it may not come amiss for me to invite their attention to a very interesting and important article relating to this subject, contributed by Dr. C. A. White to the January number of the *American naturalist* for 1883. Dr. White here very concisely describes the peculiar structure of the vocal organs of *Pituophis*, which, so far as I am aware, he is the first to have noticed.

The character of the voice of the bull-snake is well known; and Dr. White clearly shows in his article how the peculiar form of the epiglottis contributes to its production.

It may not be out of place to reproduce the drawings here, that I was permitted to make for Dr. White, illustrating this structure of the epiglottis in *Pituophis*. They may be of interest to those who have the opportunities of seeing the pages of *Science*, where the *Naturalist* may not be available.

In again calling attention to this structure and its situation, it may induce others to make further investigations into a very inviting subject.

R. W. SHUFELDT, U.S.A.

Fort Wingate, N.Mex., March 19.

The Indians are the mound-builders.

In No. 108 of *Science* there is a review of 'Prehistoric America,'—a work by the Marquis de Nadaillac,—and at the end of the review an editorial note which has challenged my attention. You say that the review "seems to maintain the identity of all peoples that ever inhabited the American continent up to the advent of Europeans," and base this upon the opinions of the reviewer, that the mound-builders were no other than the Indian tribes found in the country in post-Columbian time, and their ancestors. In this respect I most heartily agree with the opinions of your reviewer. There has never been presented one item of evidence that the mound-builders were a people of culture superior to that of the tribes that inhabited the valley of the Mississippi a hundred years ago. The evidence is complete that these tribes have built mounds within the historic period; and no mounds or earthworks have been discovered superior in structure or contents to those known to have been built in historic times. The theory that the country was inhabited by a people highly organized as nations, and having arts of a higher grade than those belonging to tribal society, is wild and

baseless; and the fruit of that theory is nothing but exaggeration and false statement.

All this being granted, your own conclusion, which is not found in the statements of the reviewer, is altogether inadmissible. "The identity of all peoples that ever inhabited the American continent, up to the advent of Europeans," is not and can not be held by any intelligent anthropologist, except in some very broad sense; as, for example, that they belonged to the human race, or that they occupied one continent. In respect to mythologies, languages, and institutions, there are, and have been, many distinct peoples; and in respect to arts there is much diversity, though arts travel from people to people with the greatest ease. At the present time we cannot have fewer than seventy distinct peoples among the tribes of North America, and in antiquity the number may have been greater. The mound-building peoples did not constitute a distinct race. Many peoples have built mounds on this continent, and some continue to build mounds to the present day. The writer has seen a tribe of Indians erect a mound.

J. W. POWELL.

Washington, March 24.

THE RELATIONS OF MICROBES TO LIFE.

OWING to the fact that some microscopic organisms have been shown to play an important part in many forms of disease, we are somewhat in the habit of looking upon such organisms in general as our enemies, forgetting many useful purposes which they serve. One of the most important processes taking place on the surface of the globe is the destruction of such organic masses as have been the seat of life, but which have suffered death. We have only to think for a moment what the result of a stopping of this destructive process would be, in order to gain a vivid impression in regard to its importance. The living thing can resist the destructive forces. When life ceases, the resisting-power is gone; and, however complex the materials may be of which the organism is made up, they are quickly converted into simple and stable substances. The chief products of the changes are carbon dioxide, water and ammonia, all of which are of high importance, as from them again, under the influence of life, are elaborated the complex materials. Now, we know, that, in the breaking-down of organic matter after death, microscopic organisms play a principal rôle. They are the efficient scavengers of the earth. They effect the transfer of the oxygen of the air to the substances to be destroyed, and thus convert useless organic matter into that which is useful.

We thus see, that, while there are microbes which cause disease, there are others constantly at work keeping the conditions favorable to life. Recently the suggestion has been made, and by no less an authority than Pasteur, that the changes which are involved in the life-process of both plants and animals are probably intimately associated with the activity of what may be called life-microbes. Pasteur read before the Academy of sciences a paper by Duclaux, in which some experiments upon the growth of plants in sterilized soils are described. Duclaux's paper begins thus: "The destruction of the organic matter of the soil by microbes, and the production of a new vege-

tation on the soil, are two phenomena which always accompany one another. Is there any necessary connection between them? Through the labors of Pasteur, we know that microscopic beings can only live at the expense of complex materials elaborated by the plant with the aid of chlorophyl. Can the plant develop in the absence of microscopic beings? in other words, can it, without their aid, utilize the organic matter left by the plant which preceded it on the soil?"

With the object of attempting to answer this question, Duclaux experimented upon peas and beans. These were freed from germs, sown in a soil which was free from germs, and supplied with organic matter of a kind which one would naturally expect to be easily assimilated. The result was, that after one or two months the organic matter was found to be unchanged, and the plants did not thrive any better than when placed in distilled water.

Pasteur, in commenting on these experiments, takes occasion to suggest to Duclaux an experiment on the rôle which microbes play in animal life. The experiment is this. A hen's egg, from the surface of which all germs have been removed, is to be hatched in a sterilized space, fed with sterilized food, and supplied with sterilized air. Pasteur believes that the result will be that the chick will not live, and, in general, that life is impossible without the co-operation of microbes.

We must bear in mind that this is merely a suggestion, and that it rests at present upon no experimental evidence. Experiments of the kind suggested will involve great labor and the greatest accuracy. It cannot be denied, that, whether the results should prove favorable or unfavorable to the view of Pasteur, they would be of the highest interest to the chemist and biologist.

THE CLIMATE OF THE EGYPTIAN SUDAN.

IN so vast a region of country as the Egyptian Sudan, extending as it does over about sixteen or eighteen degrees of latitude and as many of longitude, with differences of alti-

tude of more than six thousand feet on single parallels, it is evident that there must be great diversity of climate, a full discussion of which would occupy too much space for a reasonable article. But that portion of the Egyptian Sudan which at this time attracts the attention of the world by reason of the presence there of European troops, and the apparently intended operations of those troops, can be here concisely considered.

British troops now occupy two positions in the Egyptian Sudan; viz., the province of Dongola on the Nile, and the city and port of Suakin on the coast of the Red Sea.

Italian troops occupy the port and vicinity of Massowah, on the Red-Sea coast; and the Bay of Assab and its vicinity, on the same coast, near the strait of Bab-el-Mandeb.

Whatever may be the object of the Italian government in thus occupying positions on the Red-Sea coast, the object of the present British occupation is declared to be war against El Mahdi, and it will be necessary to consider the climate of the territories occupied by his forces.

El Mahdi now occupies and rules over the following: the province of Khartum, the province of Darfur, the province of Kordofan, the province of Senaar, the province of Berber, the district of Gallabat, the province of Taka (excepting the capital, Kassala), and the great desert region between the Nile near Berber, and the Red-Sea coast near Suakin and Agig.

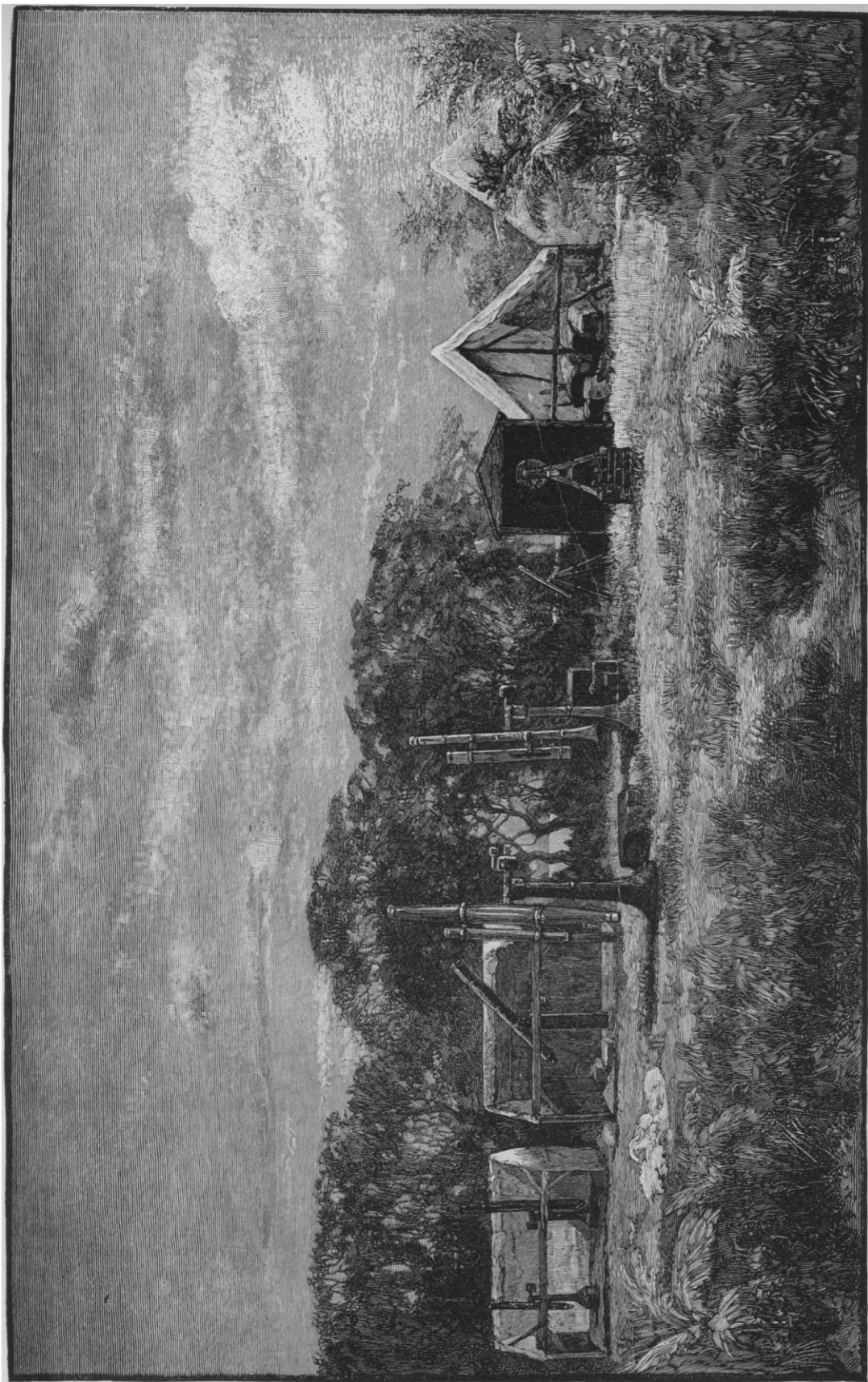
Thus we have to consider the climate in the provinces and districts above named; and first the province of Dongola, now occupied by the expeditionary corps under Gen. Lord Wolseley, of probably about nine thousand British troops.

This is one of the rich and productive provinces of the Egyptian Sudan, extending from near Wady Halfa on the north, to the borders of the province of Berber along the course of the Nile. The correspondence from Lord Wolseley's corps has, during the past few months, made almost every hamlet and village throughout its length known to all parts of the world where newspapers are read. The climate of the region now occupied by the British force is not only good, but very agreeable, during four months of the year,—November, December, January, and February,—though February sometimes gives specimen days of the Khamseen wind which are very trying, even to natives of the country. During the months of March, April, May, and the first half of June, however, the climate, though not *very* unhealthy, is exceeding trying to all excepting

natives of the country. The ordinary temperature is very high during the day; the thermometer in the shade often indicating from 95° to 110° F., while during the night the temperature falls to 65° or 70°. This great difference makes it necessary to take great care to preserve health; and, with the best of care, intermittent fevers are exceedingly prevalent. These, if neglected, are liable to take typhoid forms. During these months, the dust-storms coming from the southward are of most distressing frequency and violence. While these storms are hard to endure, and cause great suffering, I believe they to a certain extent destroy fever-germs, and prevent the climate from being so fatal to Europeans as it would otherwise be. From June to September the southerly and south-westerly winds come charged with moisture, though rarely yielding rain; and, while relieved from the dust-storms, the European is more subject to fever influences.

Such is the climate in which the British troops are apparently to wait during the next five months, before advancing against their human enemy. Should they wait there, under the best possible care and with the best possible medical surveillance, the commander will be fortunate should the 'unseen enemy' not reduce his force by more than ten per cent before October next, while another ten per cent would be so debilitated by repeated fever-attacks as to require a month of cool weather to restore their strength, and make them fit for a vigorous campaign.

The climate of Suakin can hardly be considered unhealthy, but for the excessive heat which reigns there, except during the three months of December, January, and February. There the desert comes down to the very seabeach; and the air of the desert, though burning hot, is not unwholesome. But the heat in that region, where sometimes during two or three successive years rain does not fall, while the tropical sunbeams constantly bathe the rocks and sands, is of an intensity not to be conceived by those who have never experienced the like; and exposure to it by Europeans, without extraordinary precautions, is certain to produce sunstroke and congestions. The thermometer in April, in the shade, will often indicate a temperature of 100° to 105° F.; but even this does not indicate the effect upon a foot-soldier, who, marching in the sun, receives the direct rays, and, in addition, suffers from the heat radiated and reflected from the light-colored soil. It is, however, quite different with the *mounted* soldier, whether on horse-back or on camel-back; as, if well covered, he



GENERAL VIEW OF THE ASTRONOMICAL STATION AT CAROLINE ISLAND.

suffers less from the direct rays of the sun, and not at all from the reflected and radiated heat. As the entire route from Suakin to Berber is subject to heats fully equal to those of the vicinity of Suakin, it may be safely asserted that it is impracticable for European foot-soldiers to make the march between those two points during the spring and summer months, except by using the night and early morning exclusively for marching.

The climate of the province of Berber is very similar to that of Dongola; but, owing to the effects of the waters of the river Atbara, in some parts of this province fevers are more prevalent during the summer months, and of a worse type than in Dongola.

In the province of Taka and the district of Gallabat, the climate from June to October is deadly for Europeans. During that season the rains are there copious, and, mingling with the floods of water coming down from the mountains of Abyssinia, cause the rich soil to become like a saturated sponge, while the rank vegetation and the exhalations from the soil render the air poisonous. From many districts the natives abandon the country in May, taking with them their families, their flocks and their herds,—to save themselves and their families from fever; and their flocks and herds from the ravages of the stinging insects which, during the season of rains, infest the country. These people go north to the deserts, and remain until the latter part of October, when they return, to find their own country delightful in climate, and glorious in vegetation. These conditions remain through the winter, and the air is healthful until April.

The climate of Khartum is hot, damp, and exceedingly unhealthy from April until October. The winter climate is not disagreeable; but even in winter the place can hardly be considered healthy, owing to the peculiar location of the town between the Blue and White Niles, and to lack of sanitary rule in the construction of the streets and houses. During the past twenty years, more care has been taken in the construction of dwellings; and the conditions are now more favorable than they formerly were.

The province of Kordofan is visited by less rain than that of Khartum or of Taka. During the winter, from the last of October until the 1st of March, the climate is very agreeable and quite healthy. The prevailing winds are from the north. The temperature is not high, ranging in the middle of the day from 80° to 88° F. The air is bracing and invigorating, while the nights are cool and pleasant.

March, April, and May are there the hottest and most disagreeable season, though not unhealthy. In June the season of rains commences, and it lasts until the latter part of September or early October. The winds are then from the south and south-west. The rains come in showers, sometimes daily, but oftener once in three or four days. The air is debilitating; and fevers, intermittent in form, strike all excepting the natives.

No matter what care may be taken to guard troops from the effects of climate, the death-rate among soldiers is always great during this wet season. In an expedition which I sent into that province, well organized, well and very carefully commanded, well supplied, with good medical attendance and good hospital supplies, six per cent of the soldiers died during four months of the season of rains, while during the remainder of the year there were very few deaths.

The climate of Darfur closely resembles that of Kordofan. The rains come at the same time of year, and the sanitary effects of the different seasons are nearly the same; yet the fevers, according to the reports of the medical officers, seem to be more often severe in type in Darfur than in Kordofan. C. P. STONE.

THE CAROLINE ISLAND ECLIPSE EXPEDITION.

THE protracted duration of totality of the eclipse of May, 1883, early attracted the attention of astronomers; but an examination of its shadow-track on the earth showed the unfortunate fact that it would begin in the Pacific just east of Australia, and completely traverse the ocean, finally leaving the earth before the South American continent was reached. Only one eclipse had ever been observed with a greater duration of totality; and the possibility that an observing-station might be available in the small islands of the South Pacific determined Mr. Charles H. Rockwell of Tarrytown, N.Y., to endeavor to organize an observing expedition from the United States. Through his representations, the National academy of sciences was brought to consider the matter, and it was expected that Professor Young of Princeton would have the entire charge of the expedition. Unforeseen circumstances prevented this, and the party was finally organized with Professor Holden as chief, and sci-

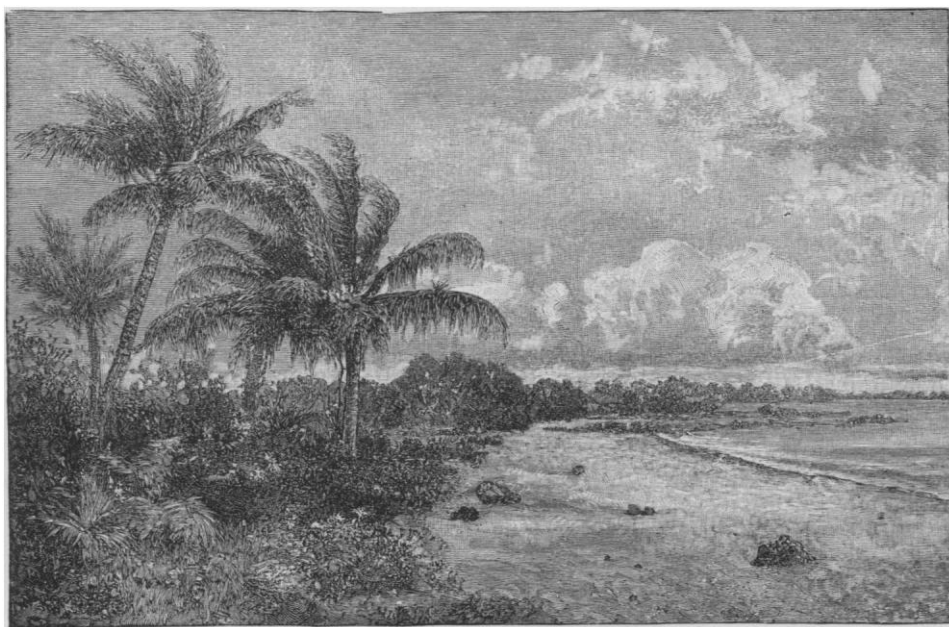
Report of the eclipse expedition to Caroline Island, May, 1883. In vol. ii. of the *Memoirs of the national academy of sciences*. Washington, 1884. 146 p., 22 pl. 4°.

entific director. Pretty full accounts of the expedition, its objects, methods, and results, have already been published in *Science*, vol. i., at pp. 299 and 594, and vol. ii. p. 237.

Some idea of the magnitude of the undertaking may be gained when it is known, that, in addition to the elaborate home preparations of the instruments and apparatus for specialized investigations, the observers were absent from the United States more than three months, during the most of which they were travelling (some fifteen thousand miles, in all), and that ten full weeks were passed at sea.

They were expected to take up their abode

wisely devoted themselves to the study of the island in every particular; and their researches, although secondary to the main purpose of the expedition, have quite as much of interest as, if they are not of equal importance with, the results pertaining purely to the eclipse. First, Professor Holden gives us the history of the island; from which we learn that it was first seen in 1795, that it was once known as Thornton Island, and that in 1868 Capt. Nares, R.N., took possession of it for the British. Ten years later guano was exported from the island, — an item of interest when connected with the fact, that, in seeking for the deposits, the for-



THE BEACH OF THE LAGOON AT CAROLINE ISLAND.

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somewhere on a small group of islands, about which nothing of importance could be ascertained beforehand, save the bare fact of their existence at a known spot in mid-ocean. The whole undertaking, however, was accomplished without a mishap of any kind occurring to interfere with the success of the work.

On the morning of the eclipse there were three rain-showers, and several persistent banks of clouds. The critical moments of totality, however, were passed with an unclouded sky; and the observations of the parties were successful, owing to the apparent accident of the dissipation of a local cloud.

So little was known of Caroline Island, that Professor Holden and the members of his party

mer owners of the island came upon native *marais*, or burial-places, numbering altogether fifty, in which they found stone axes and relics of various sorts.

The island, as it was in 1883, is well described by Professor Holden and Lieut. Qualtrough, the former quoting from Dana's 'Coral and coral islands,' and Darwin's 'Voyage of the Beagle,' their accounts of typical coral atolls. By supplementing these descriptions with the statement that Caroline Island is in general a pear-shaped ring of islets encircling a lagoon, the characteristic features of the islands become perfectly understood. A few facts from Lieut. Qualtrough's paper will be of interest: that there are, in all, twenty-five islets, well

covered with trees and shrubbery; that tidal observations in the lagoon show no relation between the rise and fall inside the lagoon, and outside; that the weather, though mostly fine, is somewhat changeable, with occasional sudden showers; and that the climate of the island, though warm, is delightful, the surrounding sea conducing to an equable temperature.

Mr. Upton presents a very full paper, occupying nearly one-third of the volume, on the meteorology of the island during the period of two weeks extending from April 25 to May 9. Frequent observations were made with the ordinary meteorological instruments, and with special radiation apparatus furnished by the chief signal-officer. The meteorological bearings of the eclipse were carefully attended to, and the observations are fully discussed, and the results clearly presented in graphical form.

One section of the report was prepared by Professor Trelease, and relates to the botany of Caroline Island as represented by the collections of Dr. Dixon, U. S. navy, who contributes also a page or two of interesting notes on the zoölogy of the island. The lepidoptera received attention, and the valuable collection made by Dr. Palisa was taken to Vienna for identification. At Professor Holden's request, however, he very kindly made and presented to the American expedition as complete a collection of duplicates as was possible; and these are reported upon by Mr. Butler of the British museum, and Mr. Strecker of Pennsylvania.

Coming now to the physical and astronomical results of the expedition, we find first a condensed statement of Professor Holden's plan of operations on the day of the eclipse, followed by the reports of all the observers on the special fields of work assigned to them. During the period of totality, Professor Holden devoted his own attention to the search for intra-mercurial planets, with the negative result long since known, and which he regards as conclusive to such an extent that "at future eclipses it will not be necessary to devote an observer and a telescope to the further prosecution of this search." Dr. Hastings, with an unusual equipment for polariscopic and spectroscopic work, gave his entire time to the solar corona. He found that with delicate methods the brighter portions of the corona ought to be observable more than a minute before totality. Dr. Hastings presents his own observations, and concludes that "the enormous change in the extent to which the 1474 line could be traced east and west of

the sun, with very slight change of the moon's place, precludes the explanation hitherto accepted of a gaseous atmosphere extending as far as implied by the spectroscope." Regarding these results, then, as strongly indicating the need of a different explanation of the observed phenomena, he institutes a thorough review of the results of all the observations of the corona at previous eclipses, and groups them under the head of spectroscopic analysis, polarization, and photography. The hitherto accepted explanation of the phenomena is then briefly set forth; and following it his own explanation is proposed, which is, that the coronal phenomena may be fully accounted for by applying the well-known principles of diffraction to the sunlight which grazes the edge of the lunar disk, and is propagated to the eye of the observer.

THE PHYSICAL FEATURES OF BRAZIL.¹

THE greater part of the empire consists of an elevated plateau, having the mean elevation of from 300 to 1,000 metres, limited on the north and west by the great continental depressions of the Amazonas and Paraguay basins, which are almost united through the valley of the Madeira, and its tributary the Guaporé. A portion of the elevated plateau of Guiana, nearly the whole of the great Amazonian depression, and the upper part of that of the Paraguay, are also included in the empire. In addition to these four grand natural physical divisions, there is also an Atlantic border-region, forming a narrow strip between the ocean and the eastern margin of the great continental plateau.

Although generally represented as wholly mountainous, the Brazilian plateau consists in great part of tablelands, which, from the deep excavation of the innumerable river-valleys, have become very much accidented, so as to present a mountainous aspect. The true mountains (restricting the term to the elevations formed by upheaved strata) are mainly in the eastern and central portions, and may be considered as constituting two groups, nearly separated by the elevated tablelands of the Paraná and São Francisco basins.

The eastern or maritime group accompanies the coast of the Atlantic at a short distance from the sea, from near the north-east shoulder of the continent at Cape São Roque, to or near the southern limits of the empire. The central or Goyaz group occupies a part of the southern portion of the province of Goyaz, and that part of the province of Minas Geraes lying to the west of the São Francisco, and is joined to the eastern group by a transverse ridge extending in the direction east-west, across the southern portion of the province of Minas Geraes. This transverse ridge, with the mountains of Goyaz, forms part of the great east and west watershed of the con-

¹ From the *Rio News*.

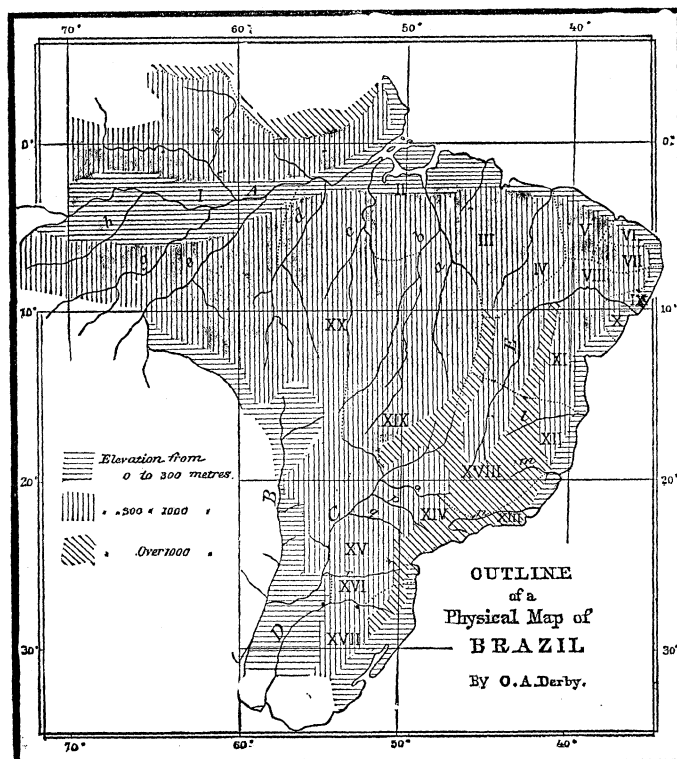
tinent, which is generally known as the Serra das Vertentes, — an improper designation, since a considerable portion of the watershed is not, properly speaking, mountainous.

The mountains of the eastern group form a long and comparatively narrow zone of about sixty miles in maximum width in the provinces south of Rio de

Serra da Mantiqueira, at the angle of the three provinces of Rio de Janeiro, São Paulo, and Minas Geraes, with 2,712 metres of elevation above the level of the sea; this last being the highest point of the empire. Somewhat to the north of Rio de Janeiro the culminating line of the group passes from the Serra da Mantiqueira, which continues in a north-easterly direction, to a branch, which, under the name of Serra do Espinhaço, extends north, or a little east of north, along the eastern margin of the São Francisco basin. The highest points of this range are the peaks of Itacolumi (1,752 metres) and Caraça (1,955 metres), near Ouro Preto; the peak of Piedade, near Sabará (1,783 metres); and Itambé, near Diamantina (1,823 metres). The mountains of this group become lower in the provinces north and south of those above indicated, and to the northward of the São Francisco are represented by short detached ranges and isolated peaks.

The western mountain group consists of at least two distinct ranges, — that of the Serra da Canastra, or Matta da Corda, extending in a general northerly direction from the head waters of the São Francisco to the southern rim of the basin of its great western tributary the Paracatu; and the mountains of southern Goyaz, extending in a north-easterly direction between the heads of the Tocantins, Araguaya, and Paraná basins. The first is an offset from a broad expansion of the Mantiqueira Range, which, in southern Minas Geraes and northern São Paulo, extends westward to, and somewhat beyond, the head of the São Francisco. Its culminating point is the Serra da Canastra, at the source of the São Francisco, which rises 1,282 metres above the sea. The limits and extension of the Goyaz chain cannot be definitely traced, as the accounts of the geology of the region are too meagre to enable one to discriminate between the true mountains of upheaval and the ridges produced by denudation from horizontal strata. It is thus impossible, at present, to state how great a part of the various watersheds radiating from the Goyaz Mountains as a centre should be classed with them, or whether any of these ridges constitute, or not, a distinct system. The culminating point of the system is the Montes Pyreneos, near the city of Goyaz, whose height is variously estimated at from 2,310 to 2,932 metres, the former being probably nearest the truth.

The great tablelands (composed of horizontal or



RIVERS.

- A. Amazonas.
B. Paraguay.
C. Paraná.
D. Uruguay.
E. São Francisco.
F. Parahyba.
a. Tocantins.
b. Araguaya.
c. Xingu.
d. Tapajox.
e. Madeira.
f. Guaporé.

- g. Purús.
h. Juruá.
i. Javary.
j. Negro.
k. Branco.
l. Jequitinhonha.
m. Doce.
n. Parahyba.
o. Rio Grande.
p. Tietê.
q. Parapanema.
r. Iguassú.

PROVINCES.

- I. Amazonas.
II. Pará.
III. Maranhão.
IV. Piauí.
V. Ceará.
VI. Rio Grande do Norte.
VII. Parahyba.
VIII. Pernambuco.
IX. Alagoas.
X. Sergipe.

- XI. Bahia.
XII. Espírito Santo.
XIII. Rio de Janeiro.
XIV. São Paulo.
XV. Paraná.
XVI. Santa Catharina.
XVII. Rio Grande do Sul.
XVIII. Minas Geraes.
XIX. Goyaz.
XX. Matto Grosso.

Janeiro, which widens to four or five times that width in the southern part of the province of Minas Geraes, but becomes reduced to a width of from 150 to 200 miles in the region to the east of the São Francisco. In the provinces of Paraná, São Paulo, Rio de Janeiro, Espírito-Santo, and the south-eastern part of the province of Minas Geraes, where this group attains its greatest development, there are two well-defined parallel ranges, the Serra do Mar and the Serra da Mantiqueira, which extend from south-west to north-east. The culminating points are the peaks of the Organ Mountains, in the Serra do Mar, at the head of Rio Bay, 2,232 metres high; and Itatiaia, in the

nearly horizontal strata) of the Brazilian plateau are those of the Paraná, Amazonas, São Francisco, and Parnahyba basins. That of the Paraná basin, which may be considered as embracing the Uruguay, includes a large portion of the provinces of Rio Grande do Sul, Santa Catharina, Paraná, and São Paulo; a small part of south-western Minas Geraes and southern Goyaz; and the elevated portion of the province of Matto Grosso, and of the republic of Paraguay, lying between the Paraná and Paraguay. The maximum elevation along the eastern border in the provinces of Paraná and São Paulo is approximately 1,000 metres, the general level becoming a few hundred metres lower to the southward and westward, as the result not only of denudation, but also of a general lowering of the surface.

The Amazonian tableland includes the greater part of the provinces of Matto Grosso and Goyaz, a large part of southern Pará, and relatively small portions of south-eastern Amazonas and western Maranhão. It is drained by the Tocantins-Araguaya, Xingú, Tapajós, and lower Madeira, with its tributary the Guaporé, all of which descend from the tableland in a series of rapids, at a distance of from 100 to 200 miles from the Amazonas. The southern margin of this great tableland—an escarpment rising to between 800 and 1,000 metres above the level of the sea, and facing the depression of the Paraguay and Guaporé—has received the name of Serra dos Parecis.

The São Francisco tableland lies mainly to the west of that river, in the western part of the provinces of Minas Geraes and Bahia, and rises to the height of about 800 metres. It is doubtful whether or not it extends over the watershed, so as to be continuous with those of the Tocantins and Parnahyba valleys. The latter occupies all, or nearly all, of the province of Piauí, and a portion of southern Maranhão and western Ceará, and is perhaps continuous with the Amazonian tableland along the Tocantins divide.

All of these tablelands are deeply cut by numerous river-valleys so as to present almost everywhere a mountainous aspect; and the ridges formed by denudation are generally spoken of as mountains, and are represented as such on all maps of the empire.

The Brazilian portion of the Guiana plateau is very imperfectly known. Along the watershed between the Amazonas and the rivers flowing to the Caribbean Sea there are mountains whose culminating points are said to rise to the elevation of 2,000 metres or more; and spurs of high lands extend to within a few miles of the Amazonas at several points between the mouth of the Rio Negro and the sea. This region is drained by the Rio Negro, with its tributary the Rio Branco, and a number of smaller rivers, among which the Jamundá, Trombetas, Parí, Jary, and Araguay are the most important.

The great Amazonian depression is relatively narrow along the lower river, below the mouth of the Rio Negro, the average width being probably between 100 and 200 miles. Above the Rio Negro and Madeira,

in the province of Amazonas, it widens considerably, so that it presents a bottle or flask shape. The river is generally bordered by low alluvial plains, often of considerable width, which are subject to overflow, and are full of lakes and anastomosing side-channels of the great river, or of the lower courses of its tributaries. The higher lands are either tablelands less than 300 metres in height, formed by deposits peculiar to the depression, or denuded outliers of the margins of the great continental plateaus on either side, or of the Andean plateau at the head of the basin.

The Brazilian part of the Paraguay depression is the upper portion of the immense plains of the basin of that river, which form a large part of the Argentine Republic, Paraguay, and eastern Bolivia. These plains lie several hundred metres lower than the lands of the plateau that encircle them, and of its numerous spurs and outliers. They are, for the most part, but slightly elevated above the level of the rivers (the upper Paraguay and its tributaries) that traverse them, and, during the wet season, become transformed into immense lakes and marshes.

The Atlantic border-region consists of a zone, generally only a few miles in width, lying between the coast and the margin of the continental plateau. South of Rio de Janeiro it is constituted by low sand-plains full of lagoons, and by denuded spurs and outliers of the plateau. North of Rio de Janeiro there are in many places, in addition to these, hills and tablelands of formations peculiar to this coast-belt, which rise to a height of from 100 to 200 metres.

O. A. DERBY.

THE LAST CRUISE OF THE ALBATROSS IN THE GULF OF MEXICO.

ACCORDING to a late report by Lieut.-Commander Z. L. Tanner, U.S.N., commanding the U. S. fish-commission steamer Albatross, dated at New Orleans, Feb. 13, the recent short cruise of that vessel has been productive of some interesting results.

The Albatross left Washington on the afternoon of the day before Christmas (1884), and after some delay by ice in the river, and by rough weather in Chesapeake Bay, arrived at Norfolk on the morning of the 26th. Having taken in coal at Norfolk, and received the party of naturalists detailed for the cruise,¹ she put to sea on the afternoon of Jan. 3 (1885), bound for Key West. At starting, the very unusually high barometer of 31.10 was noted; but the glass began falling early next morning, with the setting-in of a smart south-east gale and heavy sea. On the 6th, the weather having moderated, a trawl-line was set for tile-fish, in 79 fathoms, off the Carolina coast, but without result. Four hauls with the beam-trawl, with wing-nets and mud-bags, in about the same locality, were more productive, bringing up many familiar species, and some new to the ship.

¹ Mr. J. E. Benedict (in charge), Capt. J. W. Collins, Dr. Tarleton H. Bean, and Mr. Thomas Lee.

A sharp gale from the southward, and heavy sea, now set in, preventing further work; and, after waiting two days for the weather to moderate, the Albatross proceeded on her way, taking several kingfish with trolling-lines as she passed along the Florida reefs. Having taken in coal at Key West, she sailed on the 15th for Havana, where she arrived the next day. Notwithstanding the rough and uneven bottom, several hauls were made with the beam-trawl in 37 fathoms, on the afternoon of the 15th, with excellent results. The next five days were occupied in daily trips out of Havana, and the constant use of the tangles and beam-trawl upon the 'Pentacrinus' ground. Thirty-two hauls, in all, were made, bringing up a large supply of sea-lilies, besides an immense variety of other things, and one specimen of sea-lily supposed to represent a new genus.

Leaving Havana on the 20th, the surface tow-net was put over on two successive evenings just after dark, with poor results, there being very little surface life. On the 21st two hauls (beam-trawl) were made in 426 and 423 fathoms, north of the western end of Cuba, with fair results, notwithstanding coral patches on the bottom. Two wrecks, one a Spanish man-of-war, were seen on Colorado reefs. On the 22d sent down tangles, and afterward small beam-trawl, in 167 fathoms, off the eastern end of Arrowsmith Banks, with excellent results, including many forms unknown to those on board.

After a week spent in studying the fauna of Cozumel Island, off the east coast of Yucatan, the Albatross, on the 29th, visited the south-west end of the island; and, while the gunning and seining parties went ashore, the ship stood off shore, and took two hauls each with the trawl and with tangles in from 137 to 231 fathoms. The tangles brought up many forms new to the party, but the trawls were not successful. Having picked up the shore parties, the ship stood away for the Campeache Banks, and made seven hauls with the beam-trawl, getting many forms new to those on board, besides using the tangles and hand-lines. It had been intended to remain here for several days; but the occurrence of a case of typhoid-fever on board made it desirable to get the sick man into hospital as soon as possible, and Pensacola was headed for as the nearest. There coal was taken aboard, the sick man landed, and the ship sailed again, Feb. 5, to explore the banks off Cape San Blas. On the way out from Pensacola, the three-masted schooner, Fanny Whitman, of Rockland, Me., was discovered ashore in a dangerous position, with distress-signals flying. She was towed off and set afloat; and on the 7th, fishing-lines, tangles, and trawls were put over on the banks (27 fathoms) with satisfactory results. Red groupers were found with ovaries distended, but none fully ripe. Returning to Pensacola on the 9th, the ship sailed again for New Orleans on the 10th, taking soundings every five miles from latitude 29° 27' north, longitude 87° 44' west, in a south-south-west direction, to latitude 25° 54' north, longitude 88° 2' west (698 fathoms), and running other lines in various directions, east and west, without finding any bank or shoal, and generally confirm-

ing the soundings of the coast-survey chart. Three hauls of the beam-trawl, bringing up many specimens unknown to those on board, were made about latitude 29° 10' north, longitude 88° 15' west. This locality was found to be so promising, that it will be revisited hereafter.

After running another line of soundings in the direction of New Orleans, the Albatross came to anchor off Algiers on the morning of the 13th of February.

TECHNICAL INSTRUCTION IN AMERICA.

ROYAL commissioners were appointed in England on Aug. 25, 1882, "to inquire into the instruction of the industrial classes of certain foreign countries in technical and other subjects," and "into the influence of such instruction on manufacturing and other industries at home and abroad." A thin octavo report issued in 1882, and a very voluminous report issued in 1884, contain the results of the investigations of the commission. In vol. ii. of the second report is contained the report on technical education in Canada and the United States, compiled by Mr. William Mather of Salford, Eng., a well-known manufacturer, who has indicated his enthusiasm for technical instruction by the establishment of a well-equipped school for apprentices employed at his works.

Mr. Mather arrived in New York on May 23, 1883, and, after a six-months' tour through the states and the British possessions, returned to England on Nov. 1, in the same year. Special inquiries were made by him upon the subject of technical and industrial education in twenty-two different cities, including San Francisco, Richmond, and the most important intervening cities. Not less than one hundred educational institutions and manufacturing establishments were visited, but reports were made only upon the typical institutions visited. Mr. Mather has divided the results of his inquiries into four parts:—

1°. A general view of the public schools in cities and counties, and a description of the scientific training in the colleges and universities in the various states.

2°. The technical, industrial, and manual training-schools and art-schools.

3°. The effect of these institutions on the industries of the country, through the intelligence of the proprietors, foremen, and work-people.

4°. The influences and institutions, other than schools, tending to the advancement and improvement of the industrial population.

There is also an appendix to the report, containing statistical information, letters from prominent educators, and abstracts of methods of instruction in different places.

Second report of the royal commissioners on technical instruction. Vol. ii. No. 2. Report on technical education in the United States of America and Canada. By WILLIAM MATHER. London, Eyre & Spottiswoode, 1884.

A very favorable account is given of the attendance at the schools, the subjects taught, and the methods of administration. The prevalence of illiteracy in certain sections is noted. Attention is called to certain phases of the labor question; in particular, strikes, trades-unions, machinery, wages, and prices. Several pages of the report are devoted to the technical and art schools of Canada.

The most interesting portions of the report are parts ii. and iii., relating to the colleges and institutions devoted to art, science, and technical instruction. Special attention is called to Columbia college, the Cooper union, Workingman's school (Adler's), Steven's institute, Cornell university, Massachusetts institute of technology, Sheffield scientific school, Worcester free school, St. Louis manual training-school, University of California, Girard college, Maryland institute, Johns Hopkins university, Harvard college, Hampton normal institute, and other art and science institutions. The methods of instruction, the plan of government, the resources and special features of each institution, are critically noted; but only that phase of the instruction given which pertains directly or indirectly to technical education is emphasized. Very little space is devoted to the handicraft schools in which the industrial education is made an end, and not a means to foster intellectual development. The definiteness of aim, and the practical character of the instruction given, in the schools of technology, are commended in high terms. The ambition of the student is sustained by a reasonable expectation of entering upon a useful career at the close of his scholastic labors. The employment of manual labor as a part of intellectual training is favorably commented upon. Mr. Mather quotes a familiar expression of employers of labor: 'Our brightest boys come from the country.' Not that he would disparage the mental grasp and acumen of the city-bred boys; but the habit of using a great variety of tools fits the farmer's boy to profit by the instruction given in the workshops and laboratories of polytechnic schools. Professor Brewer's recent lecture on the educational value of the farm may be here cited in confirmation of Mr. Mather's views.

As one example of the great interest taken in technical instruction by a wealthy community, mention is made of the generous endowment of a hundred thousand dollars received by the training-school of Chicago from the 'Commercial club' of that city,—an organization composed of eminent business-men. The munificent gift of Mr. Peter Cooper of New York, resulting in the erection of the 'Cooper union,' is specially noted. The St. Louis manual training-school of the Washington university is commended for its wise adaptation of manual labor to mental culture. The progress made in industrial, decorative, and the fine arts, is regarded as very gratifying.

It is somewhat unfortunate that Mr. Mather did not have time to inspect the results of the industrial art education given by Mr. Leland in the public schools of Philadelphia. The very favorable notices

already received by Mr. Leland from European educators leads the writer to believe that a close analysis of his methods by such a well qualified observer as Mr. Mather would have thrown much light upon this phase of the industrial movement in America.

Close attention was paid to the workshop-schools erected by certain great railroad corporations to educate apprentices for responsible positions in the service of the roads. The Altoona shops of the Pennsylvania railroad are cited, where a high grade of technical instruction is given to employees as a means of securing to the company 'an unbroken succession of officers.'

No comment, however, is made upon the efforts being made in several sections to introduce technical instruction into the public schools. But this phase of the industrial education movement is so recent, that it has hardly advanced beyond the domain of theory. At least three methods have been advocated by well-known educators, in regard to manual training in public schools: viz., 1°, that specific trades should be taught as a part of the present system; 2°, that manual instruction should be limited to a general use of certain tools and machines; 3°, that public workshops should be erected to teach only manual training. Mr. Mather, however, noted the difficulty experienced by boys in securing places in machine-shops, on account of their ignorance of tools and machines; and he suggests that practical instruction in this direction would be very helpful to many boys in our large cities.

Not a single institution was heard of in America, by our Manchester visitor, which aimed to give training in the textile industries. In all manufactures which involve the knowledge of the qualities of fibre, and the process of working raw material, the only safe reliance is upon skilled foreigners. No investigations were made upon the mechanical industries of the southern states; but the enormous resources of this entire section, and the possibility of educating its people to rely upon their own skill and invention, must soon attract attention to the subject of technical and industrial education in that region.

Mr. Mather is of the opinion that the technical schools of America have already accomplished great results; but their high fees often tend to exclude the artisan class. Evidences of the good influences of these schools are indeed discernible in almost all the large shops and manufactories; but the advantages have been reaped almost entirely by the employers and their managers. It is vitally important that the ordinary journeyman should share the advantages of technical training. The importance of schools of pure science is pointed out, and much gratification is expressed at the important scientific discoveries already made in some of the foremost educational institutions. No one can predict, says Mr. Mather, to what practical purposes a new scientific principle may be employed.

The special report on technical education in America was indorsed in most favorable terms by the royal commissioners, and is commended to educators as deserving of most careful perusal.

CHINESE IRON-FOUNDRIES AND RICE-PAN CASTING.

As a notable example of the patient plodding industry shown by the Chinese, may be instanced the manufacture of the very thin cast-iron ricepans which may be seen in any cook-house in Hong-Kong. The principal seats of this industry are at the towns of Sam-tiu-chuk and Fatshan. The iron used is obtained by smelting magnetic oxide. The ore is broken up and smelted with charcoal in a very primitive smelting-furnace some eight feet high. The cupola is cone-shaped, having its apex at the bottom. The single tuyere pipe is of earthenware, the opening for the emission of the blast being inclined downwards. The furnace itself is of earthenware, strengthened by hoops and longitudinal straps of iron. The whole is lined with clay several inches thick. The internal diameter at the bottom is about two feet, and at the top three feet and a half; the inside depth being about six feet. The blast is produced by a rude bellows, formed of a wooden box five feet long, by three in horizontal, and a foot and a half in vertical section. This box is divided longitudinally into two compartments, each eighteen inches square in vertical section. In each of these compartments a piston works, the valves being so arranged that one piston is effective in the up, and the other in the down or return stroke. As there is no air-chamber, the blast is not perfectly continuous. The fuel used is charcoal; and the furnace, being first heated by starting a fire with fuel alone, is then filled up with alternate layers of charcoal and ore in small fragments. The blast is urged, and, after a sufficient time has elapsed, the molten metal is drawn off from a tap-hole at the bottom, and cast into ingots. These, when intended for export, are afterwards reheated in an open forge.

For making the very thin ricepans, which are cast without handles, pure iron of native manufacture alone is used. The moulds in which the pans are cast require weeks of tedious and patient labor to bring them to perfection. They are composed of two parts, an upper and a lower, and are made of carefully puddled clay. The great secret of the process which enables the Chinese founders to cast their iron pans of such large diameter, yet so thin and light as to be scarcely thicker than a sheet of paper, appears to be the use of highly heated moulds and pure charcoal pig-iron. When the ovens and their contents have cooled down, which takes about two days, the luting attaching the upper portion of the mould to the lower is carefully removed, and, the moulds being separated, the pan can be extracted. When the operation is successful, the same mould can be used several times. The pans now have each attached to its bottom a lump of iron, which, from the extreme brittleness of the pans, requires the greatest care in its removal. These runners are carefully sawn off, and the edges smoothed down; the pan is then ready for the export market. Handles are attached to these pans by the retail dealers.

From the *Journal of the iron and steel institute*.

The pans made at Fatshan differ from the preceding in being cast with handles attached near the rim to the inner surface of the pan, which necessitates the breaking of the mould at each casting. They are usually cast much thicker and heavier than those of Sam-tiu-chuk, and occasionally one-third of foreign pig-iron is mixed with the native iron for casting. In other respects the process followed at both places is the same.

GREAT ANTIQUITY OF THE AMERICAN RACES.

In an article in the *Zeitschrift für ethnologie*, on the great antiquity of the human races, Dr. Kollmann takes American material to test his theory that the craniological varieties of mankind existed in quaternary times as they are found to-day. For this purpose, accepting the geological evidence of their antiquity as conclusive, he brings together observations and measurements upon crania from California, Illinois, Patagonia, central Brazil, and Buenos Aires. The first will be recognized immediately as the celebrated Calaveras skull. To the original measurements of Dr. Wyman, the author adds his own measurements taken upon Whitney's plate ('Auriferous gravels of California'), using for a term of comparison the heads of six Indians who visited Basle in 1882. He finds the Calaveras skull does not resemble European, but Indian crania in specific race-characters, which have persisted since the glacial epoch. The less familiar cranium from Illinois, known as the McConnel skull, was found enveloped in drift material in a cleft in a rock-bluff. It is now owned by Dr. Schmidt of Berlin, whose measurements are incorporated in the text with his conclusion, from a comparison of this skull with those in the collections at Washington and Philadelphia, that it is not unlike more recent long skulls from Illinois.

The rest of the study is based on material from South America. On the banks of the Rio Negro, Patagonia, in a stratum similar to that of the quaternary loess of the pampas, Moreno found two skulls which seem to him identical with existing forms. At the last Congrès des Americanistes, 1883, Lütken invited the attention of craniologists to the as yet unmeasured material representing the remains of thirty individuals, which Lund obtained in the cave of Sumidouro, near Lagoa Santa, Brazil. In a recent visit to Copenhagen, Dr. Kollmann measured four of the best preserved male crania, which, like one given by Lund to a Brazilian collection, and measured by Lacerda and Peixoto, are long, with broad faces. According to the latter authorities, they resemble the heads of Botocudos. The last of the group is one taken by Roth from the upper pampas formation of northern Buenos Aires. To Virchow, who took its measurements upon photographs, it recalled involuntarily the brachycephalic, prognathic skulls of Sambaquis. Nehring also stated to the Anthropological society of Berlin, that he has in his possession a Sambaqui skull from Santos, which presents a real resemblance to this.

Assuming, as he does, that these crania are all pre-glacial, and finding among them both long and short skulls, Dr. Kollmann arrives inevitably at the conclusion that already in pre-glacial times the men of America had cranial and facial forms widely differentiated into varieties which have persisted until the present time, in spite of lapse of time, and change of environment. The persistence of type leads him further to question the probability of an alteration of race-characters from change of environment, or the possibility of the development of another, more perfect race.

A KINDERGARTEN SYSTEM OF CHEMISTRY.

It appears to be a law, that, whenever a hypothesis of fundamental importance is introduced into a science, it is utilized for all sorts of purposes for which it was never intended. This is certainly true of the valence hypothesis in chemistry. The conception that the smallest particles or atoms of the elements differ from each other in regard to the number of other atoms with which they can enter into combination, is the result of a profound consideration of the facts of chemistry, and its significance can be comprehended only by those who have made a deep study of these facts. The valence hypothesis is utterly meaningless to those who do not know considerable about chemical substances and their action upon each other. Notwithstanding this, the mere mechanical considerations involved in it are so simple, and can be so readily illustrated, that we find incompetent teachers thrusting them upon the attention of beginners even before any sort of notion has been conveyed in regard to the nature of chemical action, or of the distinction between elementary and compound bodies. We need only pick up any one of the small text-books in common use, and, ten chances to one, we shall find an example of the kind of treatment referred to.

It would be difficult, however, to find any thing to equal "The chemists' and students' assistant, or, Kindergarten system of chemistry," which has recently been brought to our attention. The author or inventor of this system evidently thinks that the essential things in chemistry are not compounds, but formulas; that, if one can manipulate formulas with sufficient skill, he knows chemistry. Now, in order to deal with the formulas, it is not at all necessary to know any thing about the compounds represented. A very few simple principles, which a child can thoroughly comprehend,

are alone required. We are therefore at last in a position to study chemistry without any reference to chemical phenomena. The odor of chlorine and of sulphuretted hydrogen, the activity of oxygen, the conduct of acids towards bases, need no longer be known to the student of chemistry. Laboratories for instruction are superfluous. All we need is 'The chemists' assistant.' This wonderful thing consists of a box containing a number of blocks of different shapes. The simplest blocks, which represent the simplest atoms, have but one angle: others have two, three, four, five, or six angles, and represent respectively the bivalent, trivalent, quadrivalent, etc., elements. A collection of such blocks by itself is not a very harmful thing, and we can conceive of the blocks being used in connection with a course of instruction in chemistry without leading to an entirely false notion concerning the things represented. Their use, however, would require the greatest care, as they would be more likely to do harm than good. When we read the author's explanatory words, we first recognize the enormity of the system with which he has presented us. After stating in general terms how the blocks are to be used, he says, "For lectures or class illustrations, this system will be exceedingly useful; for the illustrations on the charts and blackboard will address the eye as well as the mind of the student, and consequently will lead to a quicker conception of the subject lectured upon."

"As this system is identical with that of the kindergarten, the young students will be charmed with the various forms which can be made by the elements, some of which are exhibited in the following illustrations."

We then find some illustrations of chemical reactions which certainly do charm the eye of even the old student. The first one represents what takes place when water acts upon calcium oxide. Oxygen, with its two points, joins two single-pointed hydrogen blocks, and we have water. Calcium (two-pointed) fits close to oxygen (also two-pointed), and we have lime. The change to the hydrate, or, as common people call it, slaked lime, is too abrupt: we therefore have an intermediate stage represented. This is called the 'cracked-up' stage, though, from the general appearance of the formulas, we are inclined to think that it might better be called the 'exploded' stage. Finally order is restored, and we have a peaceful, symmetrical-looking group, which, we are glad to be told, is 'calcic hydrate.' The idea of including in chemical equations the intermediate 'cracked-up' stage, is, we believe, original

The chemists' and students' assistant; or, Kindergarten system of chemistry. By WILLIAM FARMER. New York, Author, 1884.

with the author. It cannot fail to fascinate the youthful student in the kindergarten. It has long been maintained that the elements of some of the sciences might be taught with advantage in the kindergarten. It remained for the inventor of this system to show how readily this may be done. The expense is a mere trifle, and no preparation on the part of the teacher is required. We shall soon find our children making marsh-gas, or 'ethene dibromide,' or showing how nitrate of potassium and sulphuric acid are converted into nitric acid and hydric potassic sulphate; we shall hear them making the fine distinction between plain water and cracked-up water; and we shall be obliged to confess that the method by which we were taught the elements of chemistry was a very cumbersome one as compared with the simple method of Mr. Farmer.

While fully recognizing the humorous features in the kindergarten system of chemistry, we cannot avoid a feeling of depression when we regard it as evidence of a state of mind which is very prevalent. Too many teachers of chemistry, like Mr. Farmer, magnify the importance of formulas, and lose sight of the facts which they represent. This is the crying evil in chemical instruction at the present time. The teacher who 'knows the theory,' but doesn't 'know the practical side of the subject,' is still abroad in the land.

FONTAINE'S OLDER MESOZOIC FLORA OF VIRGINIA.

This work is one of the smallest of this series; but it is one of merit and importance. Although the number of fossil plants from Virginia strata here enumerated is not great, they are so thoroughly illustrated, and so critically discussed, that their diagnostic value is fully brought out. Professor Fontaine may fairly claim to have demonstrated, from evidence furnished by the plants alone, that these older mesozoic beds, which had not previously been clearly distinguished from the younger ones, and had been commonly grouped with the latter as the trias of Virginia, can scarcely extend so low as the extreme upper trias, and conform more closely to the rhaetic of Franconia, Bayreuth, and Palsjö, or even to the lias of Rajmahal.

This conclusion, of course, is derived from

Contributions to the knowledge of the older mesozoic flora of Virginia. By WILLIAM MORRIS FONTAINE. Washington, Government, 1883. 12 + 144 p., 54 pl. Monographs of the U. S. geological survey, vi.

an analysis of the species discovered, and a study of their affinities with species obtained from strata in other parts of the world, whose geological position is fixed with some degree of accuracy. This subject is discussed at length. The substance of it can be given in a few words.

The whole number of distinct plants described is forty-five. Eight of these were already known from other localities under established names; four more of this class are referred to different genera or species: making twelve not confined to Virginia. Of the remaining thirty-three which are so confined, nine have close affinities with species already described. It thus appears that considerably over half of the entire number are peculiar to the locality, and have no weight in determining its horizon. The decision must therefore turn entirely upon the twenty-one species which are either themselves found outside of Virginia, or are nearly allied to such as are so found.

The author has made some errors in his table of distribution, such as the omission of *Schizoneura planicostata*, which he describes in the text, and the failure to assign *Ctenophyllum Braunianum* to its proper horizon (rhaetic). These corrections made, we find that while only one of the species (*Asterocarpus platyrachis*) has its nearest affinity with an exclusively triassic plant, and only seven have their nearest affinities with exclusively Jurassic plants, there are ten which have either been found in the rhaetic only, or are most closely allied to such as have only been so found. Thus thirteen species, or about five-eighths, may be classed as rhaetic plants; and only four, or less than one-fifth, can at best be set down as triassic. The seven Jurassic species are mostly from the lias, or lower oolite, which, while not negating the rhaetic character of the Virginia beds, does seem, when coupled with the rest of the evidence, to negative their triassic character.

We have not space to go further into details, and will merely add, that, while our analysis of his facts differs slightly from that made by Professor Fontaine, the conclusion which flows from it is the same; viz., that in so far as fossil plants can be depended upon to correlate the deposits of different parts of the world, those of the Richmond coal-fields point to the rhaetic of Europe as the age to which they must be referred.

It is something to have even thus far fixed the geological position of this hitherto unsettled formation; but those who are specially interested in the progress which is taking place

in vegetable paleontology will perhaps regard as still more important the discovery and careful characterization of the twenty-eight forms which the author describes as wholly new to science, twenty-six of which receive the rank of species, and for the satisfactory classification of which he has found himself obliged to create the two new extinct genera, *Mertensides* and *Pseudodanaeopsis*. Of these twenty-six new species, eight are allied more or less closely to known forms, leaving eighteen species so distinct that the author has been unable to compare them with any thing that has been hitherto described. This is remarkable, in view of the great uniformity which is generally found to exist in the floras of the earlier geological formations at points the most widely separated geographically. It seems to indicate an unexpected divergence of the mesozoic flora of North America from that of Europe and other districts of the eastern hemisphere.

An important feature of the work, not indicated by its title, is a careful revision by Professor Fontaine of the researches in the same line of Dr. Ebenezer Emmons in North Carolina, made some thirty years ago, and published in part vi. of his 'American geology,' 1857. The fossil plants found by Dr. Emmons, and figured in this work, are described under the head of 'Fossils of the trias;' but Professor Fontaine thinks he has conclusively shown, from a study of his figures and descriptions (the fossils themselves having been destroyed during the war), that this 'trias' of Emmons in North Carolina is identical with his 'older mesozoic' of Virginia.

The work is copiously illustrated, there being, in all, fifty-four plates, the last six or seven of which are devoted to the reproduction of the figures of Emmons. The photo-engraving process is employed, and we have here a standard from which to judge of its applicability to the illustration of fossil plants. In some respects it proves quite satisfactory; at least, when we consider its cheapness, and the advantage it thus furnishes of allowing, at moderate cost, the ample illustration of species, which is so great a necessity in this branch of paleontology. But we do not think the most has been made of the process in the present work.

The index, which is otherwise good, contains one feature which cannot be too highly commended to authors of such works. This is the reference to plate and figure, as well as to page; which, in more than half the cases, saves the reader the labor of looking twice.

ANNALS OF THE NAVAL OBSERVATORY.

DURING the period covered by the observations contained in these two volumes, the naval observatory was under the superintendency of the late Rear-Admiral Rodgers. His general reports to the chief of the Bureau of navigation, on the work of the institution, were promptly issued in the latter part of the years to which they refer, and are reprinted, as customarily, in the annual volumes.

Pursuant to its policy, inaugurated some five years ago, of reducing the size of its bulky publications,—a policy which has met with universal commendation,—the observatory might now go farther, and expunge a good fraction of the protracted and annually reiterated introduction to the observations with the transit-circle. We seriously question whether disastrous ambiguity would ensue if we were not told, with every year, that the ridge of the roof covering the transit-circle extends east and west; and that the hole in the cube of the axis of the instrument is 2.3 inches in diameter;—to say nothing of the continued reprint of formulae and details of reduction, which every astronomer, who has occasion to consult the volume, keeps constantly in mind. This introduction now occupies about one-fourth of the entire volume, including observations with all the instruments of the establishment, and the several appendices. We suspect, however, that the only sufficient remedy lies, not in excerption, but in rewriting *ab initio*, on the supposition that those who will read the introduction already know something.

The newly adopted form in which the observations with the transit-circle are published seems to have been very carefully studied, and is in every way a model. We should like to be able to write as strongly of the precision of the results of stellar and planetary observations with this instrument, the character of which is too well known to require characterization here. Presumably, no one is responsible for the fact that they are not better; but certainly the frequent change of observers, unavoidable in so far as the observatory itself is concerned, is not conducive to results of a high order of accuracy.

During the years 1879 and 1880, the transit-circle was under the charge of Professor Eastman, and was employed with customary

Astronomical and meteorological observations made during the years 1879 and 1880 at the U. S. naval observatory. 2 vols. Washington, Government, 1882-84.

regularity in observing the stars of the 'American ephemeris,' the sun, moon, and planets, and lists of miscellaneous objects chiefly used by exploration parties and expeditions in determining latitudes. In the choice of dates when observations of the bodies of the solar system, particularly the outer great planets, were made, no systematized plan of operation appears to have been followed. It would be well if the adaptation of the observations to the problems of the future investigator were kept in mind equally prominently with the fact that these bodies, a month or two preceding the opposition-time, transit the meridian at inconvenient hours beyond midnight. The days of observation should be so chosen that it will be possible to derive a series of normal places for each planet symmetrically placed with reference to the epoch of least distance from the earth.

The great equatorial, with Professors Hall and Holden as observers, was mainly occupied with work upon double stars; but the satellites of the outer planets were fully observed, as also the great nebula of Orion, the observations on which were published by Professor Holden several years ago, in his well-known monograph.

There is no record of observations with either the prime vertical transit, the mural circle, or the east transit instrument; and there is very little to show for the lesser equatorial of the observatory. The meteorological observations have been conducted on about the same plan for a long series of years, having been begun long before the Army signal-service was in successful operation as a meteorological bureau. If they are continued on the supposition that they form a valuable addition to meteorology, this would appear to be an insufficient reason; while, for any known practical bearing on astronomy, they are barely worth the making and printing.

The volume of observations for the year 1879 concludes with two appendixes, the latter of which is a determination of the semi-diameter of the moon from occultations of the Pleiades, by Mr. H. M. Paul; and the former, by Professor Hall, on the parallax of α Lyrae and 61 Cygni. In the appendix to the volume for 1880, Mr. Winlock has so collected all the observations and drawings of the great comet of 1882, made at the naval observatory, as to make them available, in considerable part, for definitive discussion of the comet's orbit.

While, on looking casually through these volumes, one is impressed with the necessity of bestowing greater care on the details of

proof-reading, it is a pleasure to note the sudden influx of new types in the printer's fonts from which the latter part of the volume for 1880 was set, replacing the old types, which had become so much worn as to make scores of figures on many pages quite indecipherable.

With the commencement of the present year, the observatory, under the superintendency of Rear-Admiral Franklin, has begun the execution of a pre-organized plan of astronomical work. This has already been printed and distributed, and the advantages to be expected from this arrangement will be watched for with much interest.

BRAIN-EXHAUSTION.

THIS book belongs to a class which finds circulation only in this country, and is not calculated to establish a foreign reputation for the author. If the time spent upon its preparation had been given to accurate observation or careful experiment, and the results condensed into an article of twenty pages, the author might have secured some attention. The work consists of a mass of theoretical statements regarding normal and abnormal brain-action, few of which have any basis in ascertained facts. We know that brain-exhaustion is possible, and we know under what conditions it occurs. The chapter on causation contains a fair summary of these conditions. We do not know the mechanism of its occurrence, and we cannot affirm, in a given case, that a definite line of treatment will succeed.

The author has a favorite method which it is the object of the book to urge. The method does not commend itself to those who are familiar with recent German investigations by experiment, which, as far as animals go, are directly opposed in their results to the conclusions reached by Dr. Corning. Electrical treatment of brain-disease must be conducted with caution, and only with the aid of an accurate galvanometer which measures the intensity of the current, and enables the physician to know at any moment what strength he is using. Of this, as well as of other necessary precautions, Dr. Corning seems unaware, for he recommends the use of from 'five to fifteen cells,' a wholly unknown quantity.

Science demands facts, not theories; and the sooner this is understood by those who seek a place in its ranks, the better.

Brain-exhaustion, with some preliminary considerations on cerebral dynamics. By J. L. CORNING, M.D. New York, Appleton, 1884. 234 p. 16".

NOTES AND NEWS.

It is announced that the next meeting of the American association for the advancement of science will be held on Aug. 26 and following days, at Ann Arbor, Mich. The vote of the association at the Philadelphia meeting was to hold the 1885 meeting at Bar Harbor, Mount Desert Island, Me., provided suitable accommodations could be secured; but, failing that, the meeting would be held at Ann Arbor. The decision was left to the permanent secretary. The correspondence of this officer has developed the fact that it would be quite impossible to hold the meeting at Bar Harbor in August, as the hotels would be overcrowded. It would only be possible in July or in the latter part of September. The decision to meet at Ann Arbor was also re-enforced by the invitations which have been received from the mayor of that city, and the president of the University of Michigan, cordially urging the association to decide to visit that place; and, as the meeting will fall in vacation, there will be ample accommodations, as fifteen hundred students and four hundred members of professors' families are cared for in term-time. The university offers to open its halls for the sectional meetings. There is no doubt that the association will thoroughly approve the decision of the permanent secretary.

— Mr. J. A. Allen, who for many years has had charge of mammals and birds at the Museum of comparative zoölogy at Cambridge, has accepted the curatorship of mammalogy and ornithology in the American museum of natural history in New York, where he will enter upon his new duties about May 1.

— The friends of rational work in physiology have achieved well-merited success in the university of Oxford. Early in March, in an overflowing 'convocation,' says *Nature*, the battle of vivisection was fought out a third time. The victory of sound sense over false sentiment has again been won; and on this occasion the vote is unmistakable. In spite of the most vigorous exertions of the opponents of physiology, the decree to endow the physiological laboratory — as the other scientific departments in the university are endowed — has been carried by the large majority of one hundred and sixty-eight. The dean of Christchurch opened the debate in a moderate speech recommending the grant. He pointed out that the vote was for teaching-purposes, and in no way concerned vivisection; for Professor Burdon Sanderson had given the most complete assurances that he would not use painful experiments on living animals for the purposes of teaching. Canon Liddon opposed the decree, on the ground that the council should have introduced further safeguards against the indiscriminate use of vivisection. He admitted that vivisection was justified in certain cases, and spoke of it as a painful necessity. The bishop of Oxford denied the moral right of man to inflict pain in order to advance knowledge, and declared vivisection to be degrading to the sensibility and humanity of the operator. The vote was supported by Professor

Dacey and Sir W. Anson, and unintentionally damaged by Dr. Acland. The last speakers were much interrupted by a clamor which prevented their remarks being heard. The announcement of the result — *placets*, 412; *non-placets*, 244 — was received with great enthusiasm, both in the arena and in the undergraduates' gallery. It is to be hoped that this decisive vote will put an end to the warfare waged against the teaching of physiology in Oxford.

— In an article in the March number of the *North-American review*, on 'the moral aspects of vivisection,' treated solely from an ethical point of view, Prof. Noah K. Davis concludes that "whoever hinders the physiologist in his duties by exciting public odium, commits a trespass on him, and on society at large, in whose interest he is laboring, and so does a multiplied wrong."

— The journal of the English Society of arts, in speaking of the testing of house-drains by smoke in order to ascertain whether the joints are tight, describes the 'Innis' smoke-rocket,' which can be used in place of the iron vessel for fire, and the pump or fan for forcing the smoke into the drain, and which is found to be much more handy and simple. The rocket is made of a composition that will generate an abundance of smoke, packed in its case hard enough to burn ten minutes, thus giving time for the inspector to light it, introduce it into the drain, insert a plug behind it, walk through the house to inspect the joints, and finally reach the roof, where the smoke is issuing from the soil-pipe. A wet cloth thrown over the top of this pipe may be used to cause a slight pressure in the pipes below, and thus render the test more severe. Such a test would appear to be more satisfactory than the introduction of peppermint-oil, and to imitate the action of sewer-gas in attempting to pass the usual traps.

— The *Academy* announces the initial number of a journal entitled *Parallax*, and supposably intended to be published monthly. It is edited by Mr. John Hampden, the valiant champion of the theory that the earth is a circular plane. The *Academy* is disposed to welcome the new periodical, as the professedly comic papers have been painfully dull of late. Mr. Hampden retains all his well-known ingenuity of vituperative expression. To call Sir Isaac Newton 'a fanatical pantheist' is a happy thought which would certainly not have occurred to everybody.

— We learn from *Nature* that the trade in children within the province of Yakutsk is the subject of an interesting note in a recent number of the *Izvestiya*. The Irkutsk geographical society had received a note from one of its members, who thus depicted the lot of girls within the province: In the last century the poorest Yakute, who had no means of supporting a large family, took his new-born child in a covering of birch-bark, and hung it on a tree in the forest to die from hunger. But the richer Russian merchants began to buy children from their poorer Yakute clients, and so several Russians purchased whole families of servants. This custom induced the Yakute communities to take care of the poorest chil-

dren; and the community was bound to feed them under the name of *Kumolan* children, who spent three days in the houses of the richer members of the community, two days in those of the moderately wealthy, and one day with the poorest. But of late the custom has arisen of selling children, and especially girls, to Olekminsk merchants, who sell them further to the Yakutes and Tunguses of the Olekminsk district. The parents sell girls for from thirty to forty roubles (from three to four pounds); and in Oleknir they are re-sold for sixty roubles, sometimes eighty roubles. Of course, this trade is made under the cover of 'taking children to bring up.' The Irkutsk society having taken interest in this communication, it has received information from Yakutsk authorities, and from a well-known student of Yakute life, Mr. Gorokhoff. It appears from these communications that such trade really exists; the chief impulse to it being given less by the work a purchased girl might do than by the possibility of receiving for her the *kalym*, that is, the money paid by men for purchasing a wife. Woman labor is at so low a price that one might have a woman in his household and pay her half a piece of cotton, 'for a shirt,' per year. But the *kalym* reaches very high prices. One rich Yakute has recently sold his daughter to a Tungus for 3,000 reindeer, and the same price was recently given by a half-idiotic Yakute for the daughter of another Yakute. Middendorff quotes also several instances of a very high *kalym* paid for girls, its average being about 500 roubles. When a Russian priest sold a girl whom he had educated, for five sables and ten skins, it was considered as a very low price. Altogether, the *kalym* is the chief cause of maintaining the trade in girls, together with the gradual impoverishment of the Yakutes.

— The second part of this season's course of Saturday scientific lectures in Washington opened March 28, with the following programme: President J. C. Welling, Oldest history in the light of newest science; Mr. Frederick W. True, Ornithorhynchus, a mammal that lays eggs; Medical Director A. L. Gihon, U.S.N., Sanitary ignorance among high and low; Mr. J. S. Diller, A trip to Mount Shasta, California; Dr. D. E. Salmon, Our invisible enemies, the plagues of animal life; Prof. T. C. Mendenhall, Weighing the earth.

— Capt. L. U. Herendeen of San Francisco communicates the following notes on prehistoric structures in Micronesia. American missionaries recently settled at Ponapé, may, it is hoped, furnish additional details hereafter.

A few years ago I visited Ponapé Island in the Pacific, in east longitude 158° 22', and north latitude 6° 50'. The island is surrounded by a reef, with a broad ship-channel between it and the island. At places in the reef there were natural breaks, that served as entrances to the harbors. In these ship-channels there were a number of islands, many of which were surrounded by a wall of stone five or six feet high; and on these islands there stood a great many low houses, built of the same kind of stone as the walls about them. These structures seem to

have been used as temples and forts. The singular feature of these islands is that the walls are a foot or more below the water. When they were built, they were evidently above the water, and connected with the mainland; but they have gradually sunk until the sea has risen a foot or more around them. The natives on the island do not know when these works were built: it is so far back in the past, that they have even no tradition of the structures. Yet the works show signs of great skill, and certainly prove that whoever built them knew thoroughly how to transport and lift heavy blocks of stone. Up in the mountains of the island there is a quarry of the same kind of stone that was used in building the wall about the islands; and in that quarry to-day there are great blocks of stone that have been hewn out, ready for transportation. The natives have no tradition touching the quarry, — who hewed the stone, when it was done, or why the work ceased. They are in greater ignorance of the great phenomena that are going on about them than the white man who touches on their island for a few hours for water. There is no doubt in my mind that the island was once inhabited by an intelligent race of people, who built the temples and forts of heavy masonry on the high bluffs of the shore of the island, and that, as the land gradually subsided, these bluffs became islands. They stand to-day with a solid wall of stone around them, partly submerged in water.

— J. Borodin describes, in the journal of the Royal microscopical society, what he believes to be the long-sought pure chlorophyll. He obtains it in a crystalline form, by slow evaporation of an alcoholic solution, though he has not yet been able to isolate the crystals. They are doubly refractive, giving a beautiful green sheen in polarized light. Their physical properties differ from those of the dark-green crystals of hypochlorine hitherto obtained.

— American zoölogists will be interested to learn what is to become of the great collections in Central-American ornithology and entomology amassed by Messrs. Salvin and Godman. A recent note in *Nature* announces that a part of it is already given to the British museum, and that the rest is to follow. One collection, presented on certain conditions not specified by *Nature*, comprises the entire series of American birds brought together by those gentlemen, numbering upwards of twenty thousand specimens, and illustrating, more than any other collection in existence, the life-history and geographical distribution of the birds of tropical America. No labor or expense has been spared in the formation of this splendid group of ornithological rarities. The other gift, which is unconditional, comprises a very fine collection of Central-American Coleoptera of the families of Cicindelidae and Carabidae. It contains 969 species, and, moreover, 7,678 examples, of which more than four hundred are types of new species described in the work entitled '*Biologia Centrali Americana*,' now in course of publication by Messrs. Salvin and Godman. To this collection will be ultimately added, by gift, the remaining families of Coleoptera, with other entomological specimens.